Excavations at Lesu, New Ireland

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Introduction

In 1969 White conducted an archaeological survey in the north-central part of New Ireland, concentrating primarily on the east coast. Excavations were conducted at two sites, Balof shelter (White 1972; Downie 1976; Downie and White 1978; White, Downie, and Ambrose 1978) and the open site of Lesu (White 1972). The latter excavations are described in this report. Preliminary analysis of the material was undertaken by White in 1970–1971 and a more complete analysis was made by Downie in 1977–1978. In this report, the sections on faunal material, pottery, shell, and bone artifacts are primarily the work of Downie; others are by White. Appendix 2, on pottery tempers, is by W. R. Dickinson.

The Site and Excavation

The village of Lesu is on the east coast of New Ireland, some 130 km south of Kavieng. Aspects of traditional village life have been described by Chinnery (1931), Powdermaker (1933), and Lewis (1969), the language by Lithgow and Claasen (1968). In 1969, the overall appearance of the village was much as described by Powdermaker, with several irregular rows of houses along the shores of a small bay and stretching north across a peninsula to a larger bay. On the southern side of the peninsula, in the area of Noatsi School, the Methodist mission, and Lesu Women's Club House, a number of linear and oval mounds rose above the generally flat ground. Some mounds were barely visible rises, while the

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largest, which ran along the northern edge of the current school oval, was c. 40 m long, 8 m wide at ground level, and rose in places more than 2 m above the ground (Plate I). All recorded mounds lie within the areas of the hamlets Simbelmalum, Penbumbu, Sapone, and Pencil (Powdermaker 1933:32), but were not mapped in detail.

The presence of archaeological materials at Lesu was brought to White's attention by schoolchildren who showed him a shell adze, stone axe-adze, and some slingstones found during bulldozing for the school oval. A small trench dug into the mound on the north side of the oval revealed some pottery—at that time the first found from New Ireland—and larger scale excavations were made there in May 1969. During this time excavations for a new house near the club house showed that pottery did not occur only in the mounds, and quantities of very rolled sherds were noted along some 250 m of present beach and out into the lagoon. The exact extent of pottery-bearing deposits was not defined. The excavations had two main aims—to recover a small sample of pottery to allow comparison with other ceramic traditions, and to gain a general impression of the artifactual and economic material associated with this tradition. Excavations were made in three locations. An initial trench 5 m × 1 m was dug to a depth of 60 cm in a low mound just west of the club house. This mound (I) proved to have a very low density of material and that which did exist was very broken. Next a 4 m × 2 m trench was opened to a depth of 4 m on the east side of the large mound (number V in the series) north of the school oval (Plates I, II). European material was found in the upper 2 m. Finally, when two very elaborately decorated sherds (Fig. 1*a,e*) were recovered from excavations for a house foundation, an area 7 m × 4 m was excavated to a depth of 1 m, some 30 m north of the club house (called Mound VI). All excavations were made in 1-m squares and depth units of 10–50 cm, depending on visible stratigraphy. Excavated soil was sieved through $^1/_4$-inch mesh.

Plate I. Part of Mound V at northern side of Noatsi School oval, with main test excavation at right and original test about 2 m to the left of it. Scale in 20-cm segments.

Plate II. Excavation in Mound V. Scale in 20-cm segments.

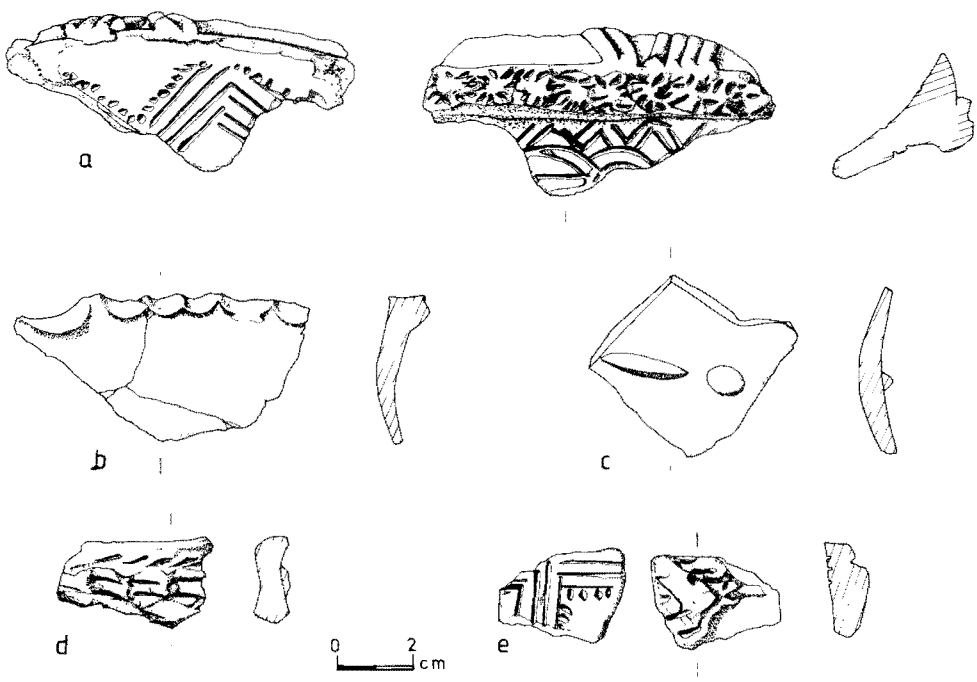

Fig. 1. Rim sherds. *a, e,* incised and applied decoration; *b,* scalloped rim sherd; *c,* applied 'sausage' and 'nub-bin'; *d,* applied and incised decoration.

For analysis, the material from each trench was grouped into a series of horizons (Table 1). This was done on the basis of visible stratigraphy in each case, but each horizon within a mound contained about the same volume of soil.

Radiocarbon Dates and Site Formation

Two radiocarbon dates were obtained from Mound V:

GaK 2441 2460 ± 120 years. From scattered lumps of wood charcoal collected from a volume 100 × 10 × 20 cm of sieved soil at a depth of 4 m below mound surface.

GaK 2440 1060 ± 250 years. From scattered lumps of charcoal between 1.5 and 2 m below surface.

Two dates were also obtained from Mound VI:

GaK 2439 1600 ± 70 years. From very small pieces of charcoal scattered over 2 m² and from 60–80 cm below surface.

GaK 2438 690 ± 170 years. From lumps of charcoal scattered over 10 cm depth some 20 cm below surface.

TABLE 1. Excavation Units and Analytical Horizons

MOUND	HORIZON	SQUARES	DEPTH UNITS
I	I	all	surface, (1)
	II	all	(2), (3)
V	I	all	surface (1), (2)
	II	K4	(3)
		all others	(3), (4), (5)
	III	K4	(4)–(6)
		K5, K6	(6)–(8)
		K7	(6)–(7)
		L4, L5	(6)–(7)
		L6, L7	(6)–(8)
	IV	K4	(7)
		K5, K6	(9)–(10)
		L5	(8)–(9)
		L6	(9)
		L7	(9)–(10)
VI	I	all	surface, (1)
	II	all	(2), (3)
	III	all	(4), (5)

All half-lives are 5570 years. All samples came from locations that appeared to be undisturbed, but consideration of the material and site relocation processes suggests that only GaK 2441 is likely to be accurate. Part of the present village of Lesu overlies the site and stands on 0.25 to 1.0 m of sandy soil, which grades into white beach sand below. This sand extends at least 100 m inland (as far as the road) and contains rolled pottery in some places. Pottery and other archaeological materials also occur in the soil above the sand. Some of this pottery, too, is rolled, and all of it is very fragmentary (the largest piece recovered barely covers the palm of a hand). Agencies now in operation that are likely to redistribute material include house-building, pit-cooking, village sweeping and other day-to-day activities, the regular burrowing of large land crabs, and occasional larger-scale human activities such as bulldozing. If, as seems probable, the prehistoric village was on the lagoon edge and beach, water and waves would also have had an effect.

White is convinced, however, that the deposits have not been totally reworked within the last century or so, since European material occurs only in the upper parts of each excavation. The carbon dates, the age of which increases with depth below surface within each excavation, also suggest that disturbance has been greatest nearest the surface. Such a statement implies, of course, that the prehistoric materials could have accumulated over a period of 2000 years or so, or could have accumulated fairly quickly. White thinks the latter is the case. The analysis of all artifactual materials shows no evidence of changes that can be related to stratigraphy, while the parallels that can be seen in ceramic decoration with pottery from the New Hebrides and other islands suggest that an age of 2000–2500 years would not be inappropriate. However, White cannot further document his belief that prehistoric Lesu was occupied for only a few hundred years, more than 2000 years ago.

FAUNA

Land and Marine Animal Fragments

Land and marine animal fragments (other than shellfish) are tabulated in Table 2. The bone, other than teeth, mostly consisted of very broken fragments and was therefore difficult to identify. Human skull fragments form nearly all the identifiable human bone.

Seventy-five percent of all the teeth are from pig, 15 percent are human, and most of the rest are dog. Fish dentaries are rare, but fish bones (mostly vertebrae) account for nearly two-thirds of the total identifiable bone. Since the relative proportion of animals is similar between the mounds, it may be taken as a general guide to the fauna of the whole site. The dominance of presumably domestic animals (pig, dog) and fish is noteworthy, and is in sharp contrast to the inland site of Balof where none of these animals were common, being replaced by marsupials that were presumably hunted.

Shellfish

Very large quantities of shellfish were present throughout all mounds sampled. Since the analysis of samples large enough to determine the relative levels of exploitation of different environments would have required more time than was available, shells from all levels of one square meter (K5) in Mound V were identified according to their probable habitats by Ian Lock (The Australian Museum).

TABLE 2. FAUNAL MATERIAL (NUMBER OF SPECIMENS)

MOUND	HORIZON	HUMAN	PIG	DOG	MACROPOD	PHALANGER	BANDICOOT	SHARK	SNAKE	FISH	BIRD	UNIDENTIFIED
A: Teeth												
I	I	–	4	–	–	–	–	–	–	–	–	–
	II	3	–	–	–	–	–	–	–	–	–	–
V	I	4	34	–	–	2	–	–	–	–	–	–
	II	9	29	–	–	–	–	2	–	–	–	–
	III	2	29	9	–	–	–	–	–	1	–	–
	IV	–	2	–	–	–	–	–	–	–	–	–
VI	I	4	18	–	1	–	–	–	–	–	–	–
	II	9	22	3	1	2	–	–	–	2	–	–
	III	1	–	–	–	–	–	–	–	–	–	–
Total		32	138	12	2	4	–	2	–	3	–	–
B: Bones												
I	I	–	–	–	1	–	–	–	–	–	–	n.c.
	II	1	–	–	1	–	–	–	–	1	–	n.c.
V	I	8	6	–	–	–	–	–	1	36	2	33
	II	18	14	–	1	1	–	–	–	33	2	65
	III	5	7	1	–	–	–	–	–	32	–	136
	IV	37	1	–	–	–	–	–	–	7	–	51
VI	I	9	1	–	–	–	–	–	–	21	4	152
	II	18	2	1	–	–	1	–	–	126	3	273
	III	3	–	–	–	–	–	–	–	33	–	15
Total		99	31	2	3	1	1	–	1	289	11	725

NOTE: n.c. = not counted.

Table 3 gives these data. The majority of the 88 varieties were collected from reef, lagoon, and brackish-water shore environments, which are the main coastal environments in the immediate vicinity of the site. Although no quantitative data are available, the dominance of reef, lagoon, and mangrove varieties is similar to that noted in Balof (Horizons I–IV), also dated to within the last 2500 years (Downie and White 1978:770–772).

ARTIFACTS

European Material (66 specimens; Fig. 2)

A variety of historic material of European origin was recovered from the upper levels of all mounds. In Mound I this material consisted entirely of glass fragments which were not retained. Material from the other mounds is tabulated (Table 4). Three items can be dated approximately. The 50-year Commonwealth of Australia medallion was issued in 1951 and must have been deposited after that date. The ceramic arm ring (Fig. 2*a*) is a European trade copy of a traditional item and was probably in use in the nineteenth or early twentieth century. The prunt mark (Fig. 2*d*) is similar to one found by Macknight in Arnhem Land (1969:313). It is from a J. H. Henkes "Stork" Geneva bottle and was made between 1845 and 1890. One fragment of clay pipestem bears a flower design in relief and may be datable (Fig. 2*b*).

TABLE 3. SHELLFISH FROM MOUND V, K5

HABITAT	VARIETIES PRESENT	HORIZON I	II	III	IV
Front reef/reef top	30	X	X	X	X
Back reef/lagoon	30	X	X	–	X
Exposed rocky shore	3	X	X	–	–
Sandy beach	4	X	X	–	–
Mangroves, mud, and stream	17	X	X	X	–
Terrestrial	4	X	–	X	–

X = present.

TABLE 4. EUROPEAN ARTIFACTS

MOUND	HORIZON	GLASS NO.	GLASS WT (g)	CLAY PIPE	NAIL	BEAD	OTHER
V	I	30	85.4	13	1	4	plastic bracelet, ceramic pipe stem, bakelite pipe stem, flat copper washer, 50 yr. C. of A. medallion, bone button, ceramic arm ring
	II	5	18.1	–	–	–	J. H. Henkes prunt mark
VI	I	4	0.6	–	–	–	plastic button

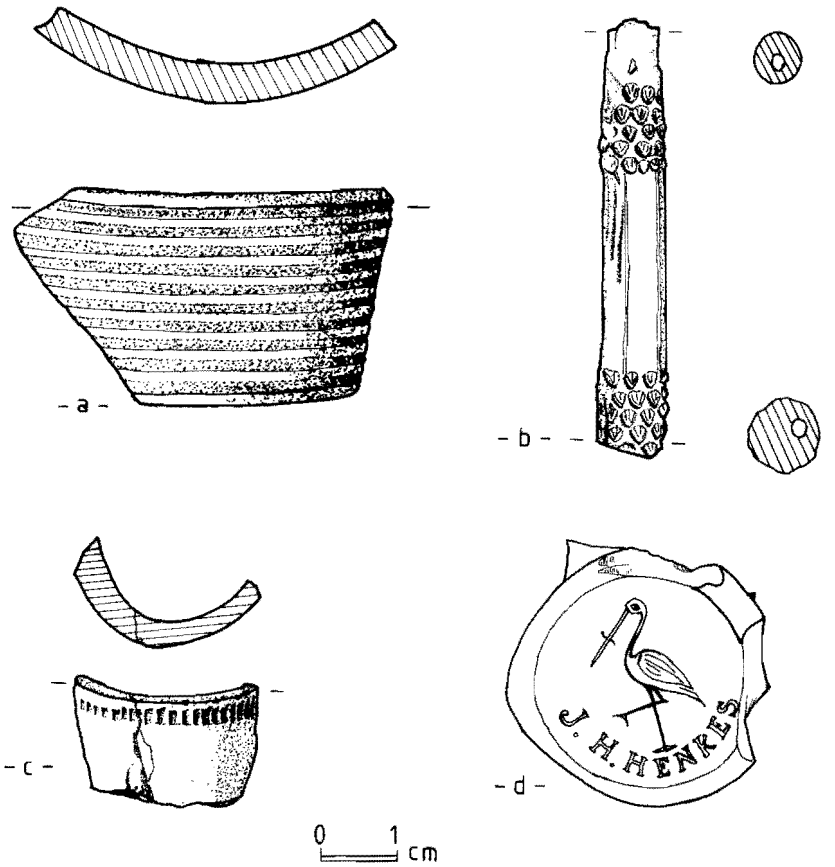

Fig. 2. European artifacts. *a,* ceramic arm-ring fragment, V/K6–L6/(1); *b,* ceramic pipe stem section, V/L3–4/(surface); *c,* clay pipe bowl, V/K6–L6/(1); *d,* glass prunt mark, V/surface.

Bone Artifacts (Fig. 3)

The only identifiable bone artifacts are spatulae *(a,b)* and unipoints *(e,f).* In addition, several pieces of worked human *(c,d)* and animal bone were found. The spatulae presumably relate to betel-nut chewing and one is stained in this fashion. No bone bipoints similar to those at Balof and there tentatively associated with hunting were found. The artifacts are listed in Appendix 1.

Shell Artifacts

a. Arm ring fragments (Mound V:22, Mound VI:45)

The majority of these are made of *Trochus* shell, but a few may be made of *Conus.* Most occur in the upper levels of each mound, but examples occur throughout. Cross sections vary widely from sublenticular (Fig. 4*d*) to subtriangular. Widths of fragments range from 3 mm to 12 mm. Seven fragments from Mound V have chipped rather than ground sides, and may be fragments broken during manufacture.

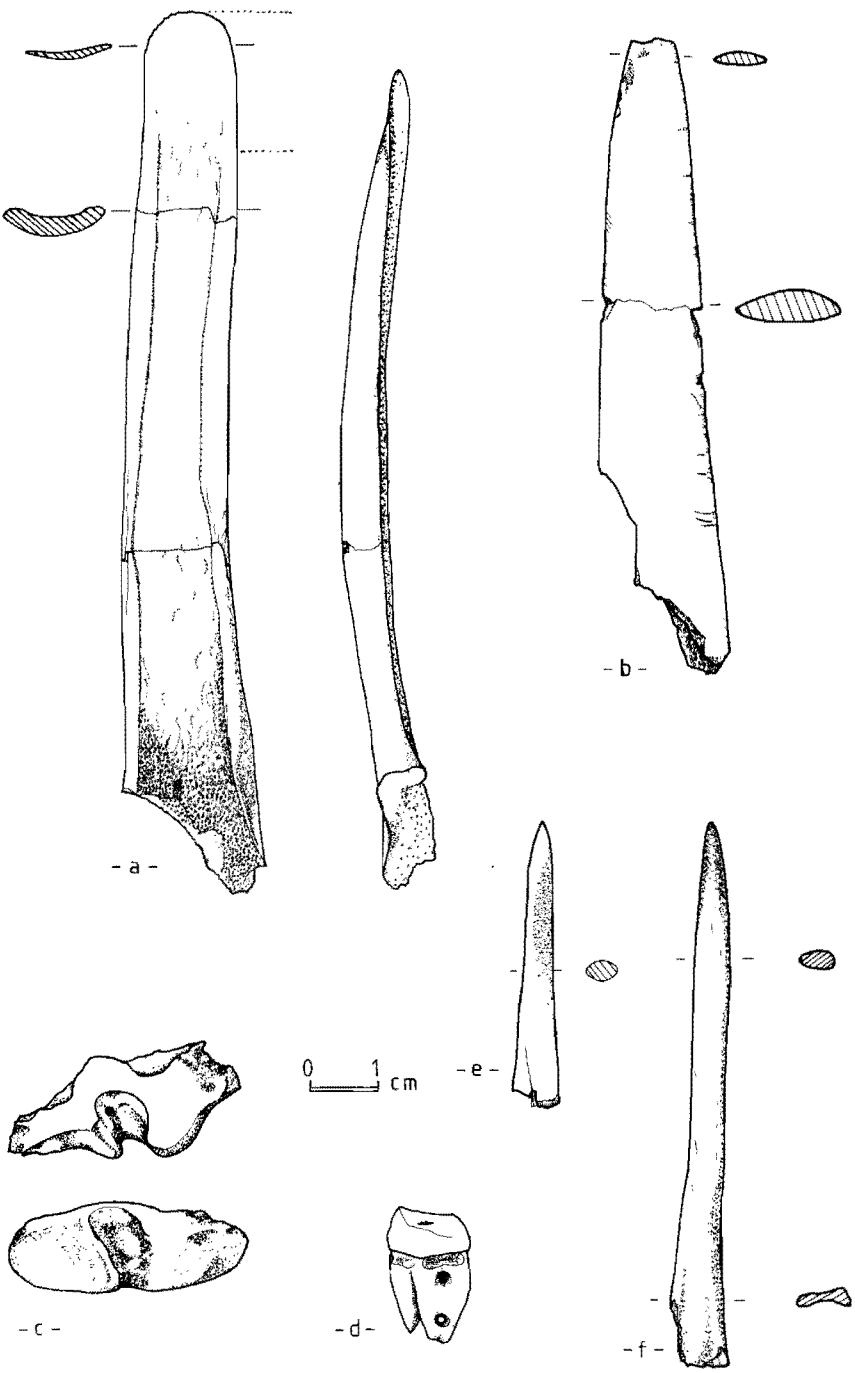

Fig. 3. Bone artifacts. *a*, spatula, V/K6/(3); *b*, spatula, VI/G3/(2); *c*, human tibia, with both sides cut and ground, V/K7/(7); *d*, human M_1, with two holes drilled through roots, (V/K3/(1); *e*, bone unipoint, V/K8/(3); *f*, bone unipoint, V/L5/(5).

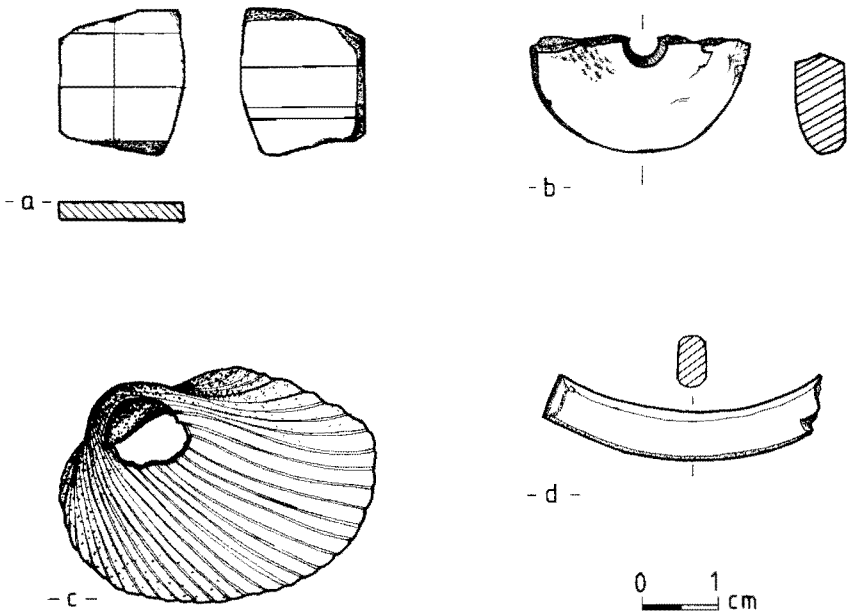

Fig. 4. *a*, incised schist fragment, V/K7/(7); *b*, stone bead fragment, V/L7/(6); *c*, shell with hole chipped in back, V/L7/(2); *d*, lenticular-sectioned shell arm-ring, V/L5/(1).

b. Edge-ground blades (Mound V:10)

All are made of *Tridacna* and have been formed by chipping and grinding. They occur throughout the depth of the deposit in Mound V, but none occur in the other two excavations. Three complete tools were found (HI:1, HII:2), all with pointed butts and symmetrically ground bevels. Sizes are highly consistent (lengths: 65, 60, 64 mm; widths: 43, 39, 43 mm). These blades are probably from adzes (Crosby 1973), with the convex outer surface of the shell forming the back of the blade (Poulsen 1970:42). Three of the seven fragments display chipping only, and may be from manufacturing fragments.

c. Worked whole shells (Mound I:1, Mound V:5)

These are: 3 small cowries with the backs ground off, a *Conus* with the base cut off and a small hole rubbed transversely in one side, and 2 bivalves with 10-mm-diameter holes chipped in the back, possibly net-sinkers (Fig. 4*c*).

d. Worked pieces, including probable scrapers (Mound I:8, Mound V:43, Mound VI:11)

These include whole mangrove bivalves with chipped edges and pieces with corners squared off or cut to a curve. The former may be scrapers.

Stone Artifacts

a. Slingstones (7)

With one exception (Mound V, HIII), all slingstones came from the top horizons of Mounds V and VI. All are made of coralline limestone and range from biconical to sphe-

roidal in shape. A very wide range of sizes occurs, best expressed in terms of weights (HI: 10, 13, 40, 67, 80, 143 g; HIII: 41 g). Figure 5*a,b* illustrates two of these.

b. Edge-ground blade fragments (19)

No whole stone axe-adze blades were found, although two are nearly whole. Both of these (Mound VI, HI, Fig. 5*c*) are symmetrical in plan and bevel and have oval cross sections, but are only partly ground. All other fragments are smaller but show no features suggesting that a different pattern exists. Table 5 shows the distribution of these artifacts. One fragment (Mound V:HIV) is made of trachy-andesite, probably from southern New Ireland, Tabar, or Lihir Islands (P. D. Hohnen, Bureau of Mineral Resources, personal communication), but other specimens are probably of local rock.

c. Incised stone (Mound V, HIII; Fig. 4*a*)

A tabular piece of schistlike material 17 mm × 19.5 mm bears incised lines on both faces. On one side are three parallel lines, on the other a pair of parallel lines with another crossing them at right angles. The probable source of the stone is southern New Ireland, Tabar, or Lihir Islands (P. D. Hohnen, personal communication).

d. Obsidian (Table 6)

Just over 300 g of obsidian flakes and pieces were excavated. The largest piece weighed 5.3 g and the mean size was 0.2 g. Most flaking was bipolar, as evidenced by 75 fingernail-sized scalar cores (White 1968; Fig. 6), along with broken pieces and flakes bearing traces of bipolar flaking as noted in other sites in Melanesia by White, Downie, and Ambrose (1978) and by Lampert (1971). A few pieces show signs of utilization along sharp edges. These pieces are often larger than the mean, but still extremely small.

The most interesting artifacts are two from Mound VI (HII and HIII; Fig. 7). Both are triangular cross-sectioned flakes (lengths 28 and 33 mm; weights 1.7 and 5.3 g) with heavy flaking along all three edges. On the lighter specimen (Fig. 7*b*) all flaking is unifacial and symmetrically placed so that each face has one retouched and one unretouched side; the heavier has two edges with unifacial working and an unretouched face between them, while the third edge is bifacially worked. Both are most likely drill or reamer points of some kind. Specimens from all horizons in Mound V are being analyzed as to source by W. Ambrose, who reports (personal communication) that the majority appear to come from Lou or Pam islands, in the Admiralty Island group. A fuller report will be published elsewhere.

e. Other stone (Mound V:9, Mound VI:4)

All but one of these 13 pieces are small flakes, and none show any evidence of use or retouch. None are from river pebbles nor are they large enough to determine sources without intensive study.

Pottery

Large numbers of potsherds occurred throughout the excavations. Most were no larger than a thumbnail and the largest piece recovered was smaller than a hand. Many sherds were also rolled and without cleanly broken edges, so that reconstruction either of forms and sizes, or of combinations of decorative elements, has been almost impossible. Table 7

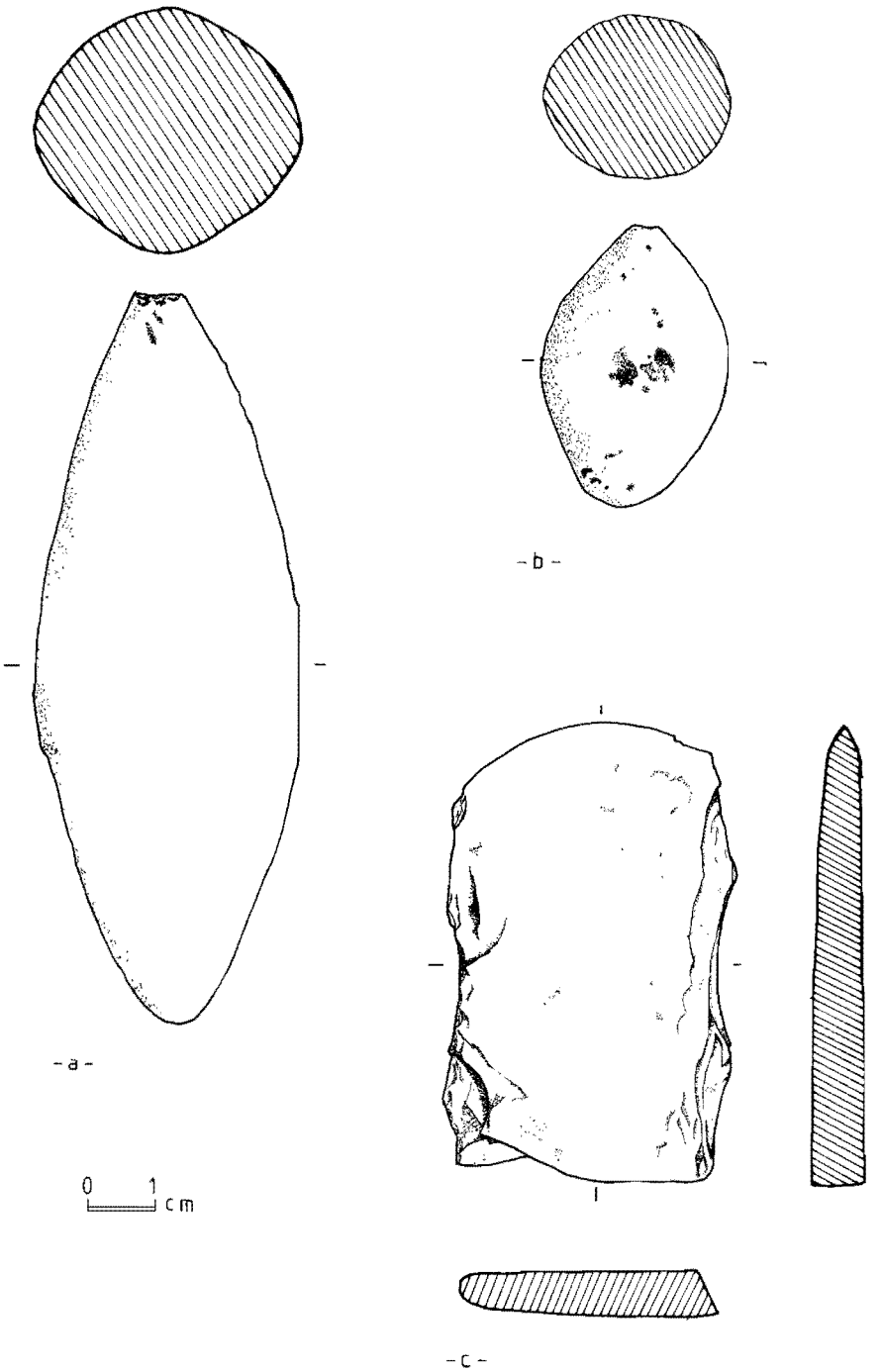

Fig. 5. *a*, slingstone, V/K3/(1); *b*, slingstone, V/L6/(7); *c*, stone axe-adze blade fragment, VI/H4/(1).

TABLE 5. EDGE-GROUND BLADE FRAGMENTS

MOUND	HORIZON	NUMBER
I	I	2
	II	1
V	I	1
	II	1
	III	2
	IV	2
VI	I	8
	II	2
	III	–

TABLE 6. OBSIDIAN

		FLAKES AND BITS		SCALAR CORES		UTILIZED PIECES	
MOUND	HORIZON	NO.	WT (g)	NO.	WT (g)	NO.	WT (g)
I	I	19	6.8	4	1.7	–	–
	II	–	–	–	–	–	–
V	I	72	20.9	6	0.7	6	7.3
	II	79	21.1	8	5.2	2	1.8
	III	333	62.5	8	2.1	4	1.8
	IV	402	69.2	35	10.2	3	5.7
VI	I	48	14.1	8	3.1	2	0.7
	II	179	50.3	5	3.2	3	4.9
	III	25	4.3	1	0.2	2	6.2
Total		1157	249.2	75	26.4	22	28.4

sets out the quantity of pottery fragments recovered from Mounds V and VI. Analysis of material from Mound V shows that the mean weight of sherds is consistently less than 1 g, and this also seems true of other collections.

Among the 22 kg of pottery recovered, 332 pieces were decorated. Of these, nearly half (152) were rims. There were also 454 fragments of plain rims (Fig. 8*a–d*).

Sherds and rims are decorated with a combination of incision and applied relief. The latter consists of continuous (bands) and discontinuous ("nubbins," "cushions," "sausages") relief. The applied clay is usually incised, impressed, or pinched into various shapes, and there are few examples of plain relief. Incisions are also made directly on rims and walls. The following terms are used to describe the decoration.

Rims

Scallops: Several methods are used to produce a scalloped effect while the clay is still malleable: (a) pushing out from the inside, so that the rim is wavy in the horizontal plane (Fig. 8*i–k*); (b) pushing down with a thumb so that the rim is wavy in the vertical plane

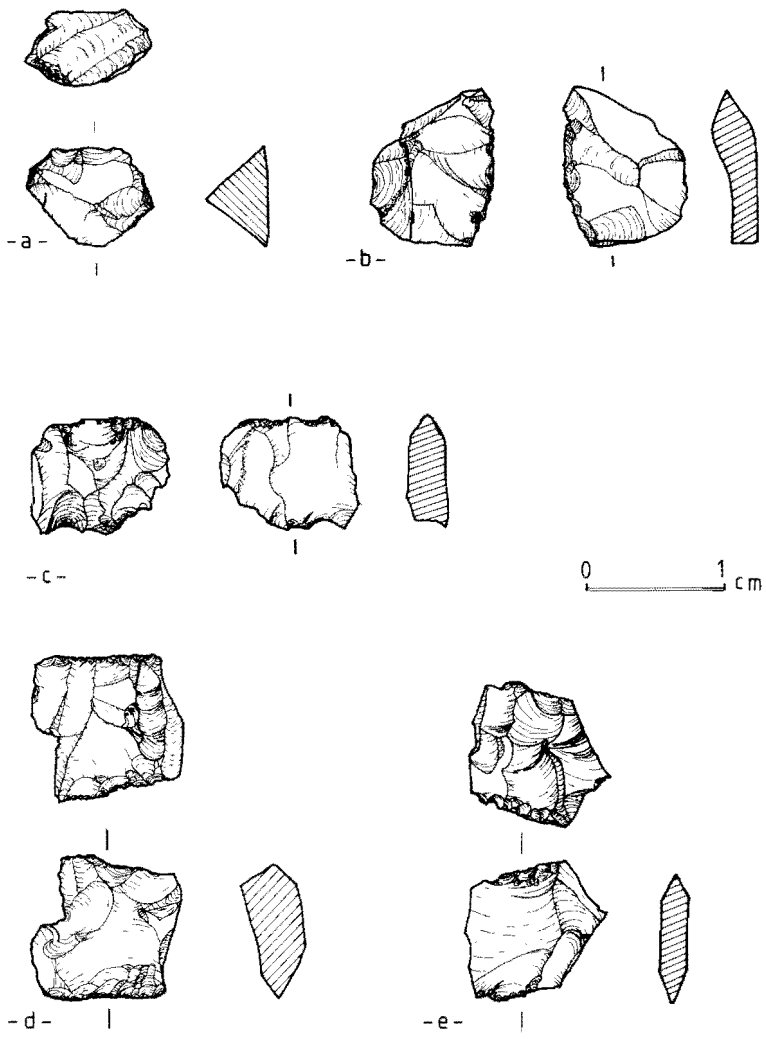

Fig. 6. Bipolar scalar cores of obsidian. *a, b, c,* V/K6/(9); *d, e,* V/K5/(10).

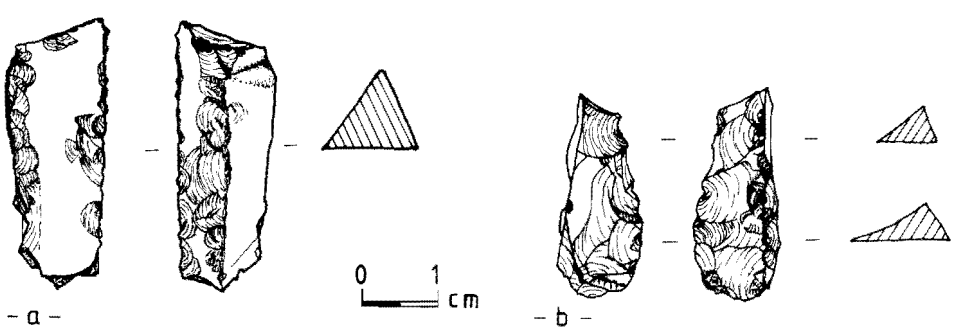

Fig. 7. Obsidian implements. *a,* VI/F3/(5); *b,* VI/H5/(2).

TABLE 7. POTTERY FROM MOUNDS V AND VI

MOUND	HORIZON	NUMBER	WEIGHT (g)	MEAN WEIGHT (g)
V	I	905	766.2	0.85
	II	1,631	1,528.0	0.94
	III	955	780.6	0.82
	IV	1,636	1,186.9	0.73
VI	I	n.c.	4,803.4	
	II	n.c.	11,962.4	
	III	n.c.	965.8	
Total			21,993.3	

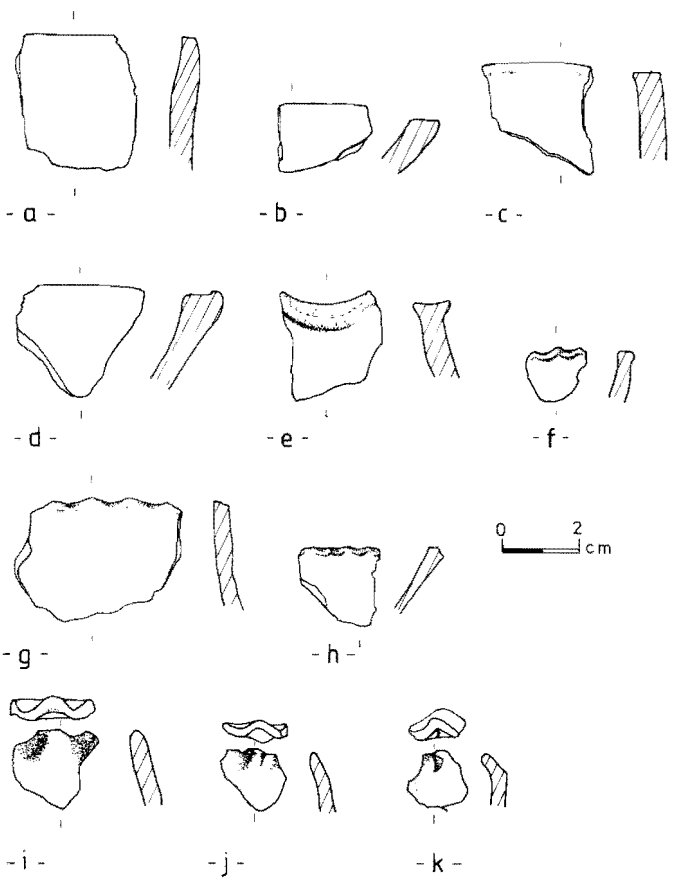

Fig. 8. Rim sherds. *a–c*, plain; *d–k*, scalloped.

(Fig. 8*e–h;* Fig. 1*b*); (c) pushing down obliquely on one side of a rim so that one wavy edge is made but the general outline is not altered.

Impressed: This type of decoration is usually found on thickened rims. Alterations are made in the outline of rims, as with scallops, but a stick or some other object is used instead of a thumb. (a) Crenellated rims have been pushed down directly at short intervals so that they look like miniature battlements; (b) if the spacing of the indentations is close, the battlement appearance is absent and the rims are then simply indented; (c) rims may also be impressed on one side. In some cases the rim has been squashed before being incised (Fig. 9*d,f*).

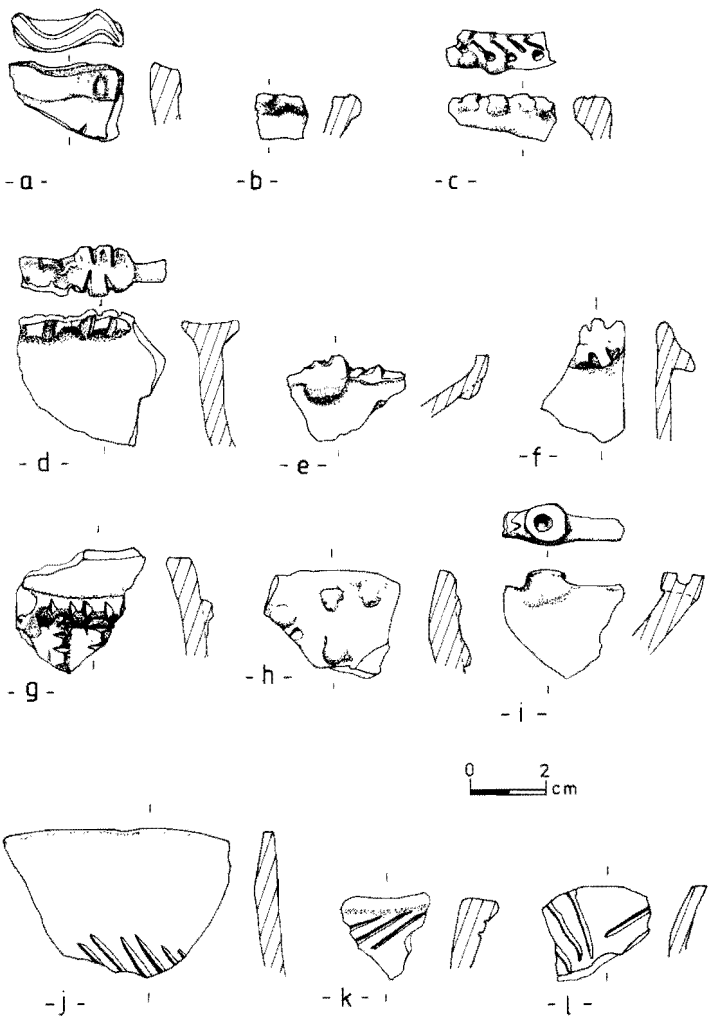

Fig. 9. Rim and body sherds. *a–c, i,* rims with applied decoration; *d, f,* squashed and incised rims; *e, h,* applied body decoration; *g,* applied and incised body decoration; *j–l,* incised body decoration.

Applied: Applied decoration occurs rarely on rims, and then to the top or outside (Fig. 9*a–c*). Nubbins are more or less circular pellets applied to the top of the rim. They are usually impressed in the center (Fig. 9*i*).

Body Decoration

Incised: This form may be done with a stick, shell, fingernail, or other tool. The sherds are too small to give much impression of the combinations in which various decorative techniques are combined, beyond the fact that particular techniques occur in rows (Fig. 9*j–l;* Fig. 10*i,j*).

Applied: The most common form of decoration consists of little rolled pieces of clay ("sausages" or "cushions") applied in clusters or rows to the pot surface (Fig. 9*e,g,h;* Fig. 10*a–h*). Many applied pieces are also incised (e.g., Fig. 1*a,d*).

The occurrence of decorated sherds is shown in Table 8. Although more decorated sherds were found in Mound VI, they there formed a lesser proportion of the total than in Mound V. Table 8 also divides sherds into temper types, the basis of which is discussed below.

Many decorative elements found at Lesu can be matched at sites in Vanuatu (New Hebrides) described by Garanger (1972). However, the resemblances occur at all sites, and no particular site can be selected as having more "Lesu-like" pottery than any other. Nonetheless, there appears to be greater similarity between Vanuatu and Lesu "incised and applied" decoration than there does between Lesu pottery and that from Watom (near

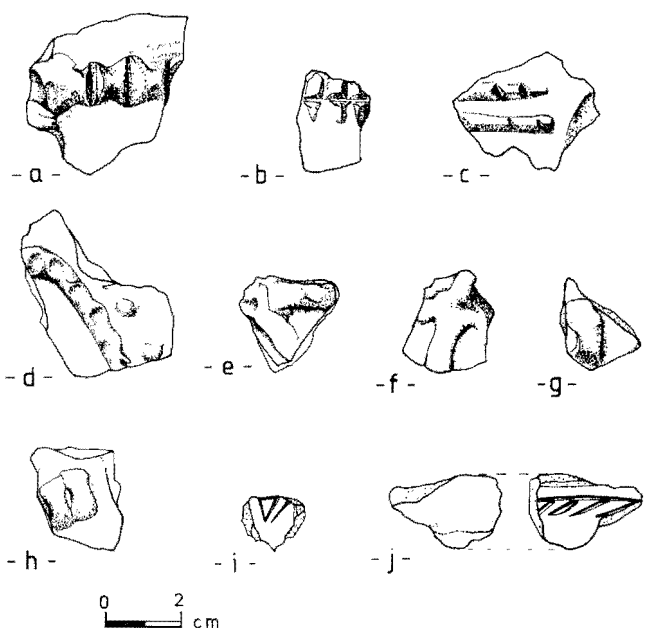

Fig. 10. Body sherds. *a–c,* applied and incised; *d–h,* applied; *i, j,* incised.

TABLE 8. NUMBER OF DECORATED SHERDS, BY MOUND, HORIZON, AND TEMPER

	MOUND I				MOUND V								MOUND VI						
	I		II		I		II		III		IV		I		II		III		
	C	V	C	V	C	V	C	V	C	V	C	V	C	V	C	V	C	V	TOTAL
BODY																			
Applied																			
Plain bands		1												3		3			7
Impressed bands		1		1	4		1						2	5	2		1	2	19
Discontinuous	1	4		1	5	11	3	5		1	2		3	14	11	13	1	1	76
Incised																			
Discrete line					2	1		4		1			2	4	2	22			38
Holes													3		3	12	2		20
Nail impressions			1		1			2											4
Lattice					1	2		1											4
Continuous lines	1				1	2	1	1						1		2			9
RIM																			
Applied																			
Vertical bands								1											1
Horizontal bands														3		2			5
Nubbins						1									2	3			6
Scallops																			
Pushed out		5			3	20		3		1			1	4	7	8			52
Pushed down	1			2		3							1		1	1			9
On one side					2	19		1						1		2			25

Incised																			
Crenellated								2		1									3
Impressed top		2			1	5		2		1			1	1	4	2	2		21
Impressed on one side	2	1		1		17		1						3		5			30
Dentate stamp						1													1
Paddle impressed						2													2
Total	5	14	1	5	20	84	5	23	–	5	2	–	13	39	32	75	6	3	332

C = calcareous temper; V = volcanic temper.

TABLE 9. NUMBER OF PLAIN RIMS, BY MOUND, HORIZON, AND TEMPER

	MOUND I				MOUND V								MOUND VI						
	I		II		I		II		III		IV		I		II		III		
	C	V	C	V	C	V	C	V	C	V	C	V	C	V	C	V	C	V	TOTAL
RIM																			
Direct	6	8	–	3	22	10	3	13	2	7	–	2	31	25	90	18	11	1	252
Thickened, straight	–	1	–	–	9	8	–	2	1	5	–	3	15	4	14	2	–	–	64
Thickened, inverted/everted	1	1	–	1	12	24	5	9	–	9	–	2	–	18	27	26	3	–	138
Total	7	10	–	4	43	42	8	24	3	21	–	7	46	47	131	46	14	1	454

C = calcareous temper; V = volcanic temper.

Rabaul) (Specht 1968) or Buka (Specht 1969) which are closer at hand. It should, however, be noted that Clay (1974:9) found two sherds with applied decoration similar to ours at Pinikindu, 20 km south of Lesu.

The similarity between Lesu and Vanuatu sites is close but not complete. Applied bands, impressed, pinched, and slashed in various ways, are similar to those from Mélé (Garanger 1972, Fig. 31), Lelepa (Figs. 72–74), Efate (Fig. 88), and Mangaasi (Figs. 127–128). Nubbins at Lesu, however, differ from those applied at Mangaasi and Efate. The former lip nubbins are flat-topped with a central hole, whereas in Vanuatu "mamelons de bords" come to a point; rows of little ovoid nubbins, variously placed at Mangaasi, are absent from Lesu; Lesu nubbins are occasionally slashed (Fig. 1*a,d*), but all Mangaasi nubbins are plain. The variety of rim shapes at Lesu is not known in Vanuatu. Indented rims occur along with a few scallops on one side, and crenellations at Tongoa (Fig. 27–28), but none of the other forms are referred to.

Location and combination of decoration: On several small shoulder sherds from Horizon I of Mound VI, there are lines of applied and incised decoration, now very eroded. However, enough remains to suggest that some vessels were decorated on and above the shoulder. One of the best examples of the combination of decorative elements was discovered during the digging of the foundations for a house in the village. This sherd (Fig. 1*a*) was part of a large shallow dish with a wide flat rim divided into two zones by a narrow plain applied band. The upper zone (11 mm wide) contains two groups of 4 and 2 sausages in opposing diagonals that meet in a V. This zone is otherwise undecorated. Closely placed nubbins slashed into star shapes run in a row around the lower zone. The body of the dish is decorated with incising on both sides. On the inside a chevron of 4 lines is outlined on the area nearest the rim by holes in V formation. The outside of the dish is decorated by incised chevrons of paired lines placed above arcs of incised lines.

Another sherd (Fig. 1*d*) from the same source is traversed by an applied band shaped like a row of end-to-end hourglasses. The wide zones are 10 mm at their widest and the waists are 5 mm wide. In the wide sections of this band are parallel indented lines 8 mm long and 3 mm apart. Above the band is a row of parallel diagonal incisions 8 mm long and 10 mm apart.

We have found no parallels to these combinations of decorative elements, but all that can be gathered from so little evidence is the knowledge that on some pots decorative elements were elaborately combined.

Plain Rims: The majority of Lesu rim sherds are undecorated (Fig. 8*a–c*) and are listed in Table 9. We use Shepard's (1965:245,247) definitions and divide plain rims into direct, thickened, and thickened and inverted or everted. Inverted and everted are grouped together because in most cases the sherds are too small to diagnose the direction.

Shepard (1965:247) explains that differences in the shape of the lips of vessels with direct rims, which may be "rounded, tapered or squarish," depend on the position of the potter's thumb and fingers, or a straight-edged tool may be used to produce a flat surface which is either horizontal or oblique. Examples of all these variations occurred among Lesu sherds with direct rims. Of sherds with direct rims, 66 percent had a calcareous temper and 34 percent a volcanic temper (see below).

Thickened Rims: All plain rims having a lip thicker than the pot-wall were so classified (Fig. 8*d*). A rim may be thickened in a variety of ways—by adding material, folding over, or scraping up material; also a lip may become thickened by the flattening-down process. Shepard says: "When a thickened rim tapers smoothly into the wall it is impossible to

determine the technique of thickening" (1965:248). This applied to most Lesu sherds with plain thickened rims.

Technology

Examination of the sherd fabrics showed that they could roughly be divided into those with marked white temper consisting of crushed shell or sand from a shelly beach (calcareous) and those with a black sand temper, volcanic in origin.

The calcareous temper consists of angular, flat fragments and smaller rounded grains. Pots with this temper are very friable, and the inner part of the fabric is black or grey, suggesting incomplete oxidation. The volcanic temper consists of fewer grains which are more varied in size and shape. Many are black, and some micaceous grains are visible. The sherds are much less friable, and oxidation frequently appears more complete. A more detailed analysis is given in Appendix 2.

There appears to be no variation in the relative occurrence of temper types in relation to their vertical occurrence (Table 10). In the sample studied, both number and weight were recorded and Table 10 also shows that calcareous sherds are more common and smaller. Interestingly, it is clear that even though calcareous sherds are more friable, and thus have a smaller mean weight, when this factor is discounted there appears to have been about twice as much calcareous pottery throughout the sample, and presumably the mound.

The occurrence of two clearly distinct tempers in the pottery raises some interesting problems since Rye (1976:118) points out that ethnographic records demonstrate that "almost all Melanesian potters each use one body composition only and produce all their vessel types from this." The one exception cited occurs on the Sepik River. However, Rye has more recently found an archaeological situation that has some similarity to Lesu, on Motupore Island, National Capital Province, Papua New Guinea (Rye, personal communication). There two different but locally available tempers were used to make pottery in some quantity.

At Lesu, it seems unlikely that the black sand was available in the immediate locality. Nothing similar was seen in the area by White and the geology of the region would make it improbable. W. R. Dickinson's petrographic study suggests that the temper would be available from elsewhere on the island or on the offshore islands, but whether it was imported as a raw material or already incorporated in pottery is not known.

TABLE 10. POTTERY FROM MOUND VI, SQUARE F3, BY TEMPER

	CALCAREOUS			VOLCANIC			RATIO OF CALCAREOUS TO VOLCANIC	
LEVEL	NO.	WT (g)	MEAN WT (g)	NO.	WT (g)	MEAN WT (g)	NO.	WT
1	107	103	0.96	46	51	1.11	2.3	2.0
2	102	106	1.04	40	73	1.83	2.6	1.5
3	103	100	0.97	24	68	2.83	4.3	1.5
4	352	267	0.76	57	115	2.02	6.2	2.3
5	454	294	0.65	94	159	1.69	4.8	1.8
Total	1118	870	0.78	261	466	1.79	4.3	1.9

TABLE 11. THICKNESS OF SHERDS IN MOUND VI, SQUARE F3

	CALCAREOUS						VOLCANIC					
THICKNESS (mm)	2	3	4	5	6	7+	2	3	4	5	6	7+
Level												
1	1	10	32	28	15	9	1	6	14	14	3	8
2	1	9	31	25	15	6	–	3	11	15	4	2
3	5	19	25	32	14	1	1	1	5	6	2	4
4	6	51	73	60	31	14	1	16	18	7	8	4
5	6	54	87	62	27	23	–	9	16	32	14	8
Total	19	143	248	207	102	53	3	35	64	74	31	26
Percent	2.5	18.6	31.6	26.9	13.2	6.9	1.3	15.0	27.5	31.8	13.3	11.2

Several sherds were broken in a manner that indicates they had been made by coiling.

Although in handling the material, we gained the impression that the calcareous pottery was thinner walled, Table 11, which analyzes the thickness of all sherds on which both surfaces were clearly visible in Mound VI, F3 shows no distinction between the two at any level. No variation in the occurrence of decoration types could be detected between the different tempers, although a larger sample might show this.

Other Pottery

Three sherds clearly do not belong to the "incised and applied" decorative tradition. All are from the surface of Mound V (Table 8). Two are covered with a confused pattern of impressed lines, apparently from a paddle. F. J. Allen (personal communication) informs us that these are very similar to pottery made on Manus Island. The third sherd is from a shoulder. Decoration by a toothed stamp consists of a narrow lattice-work band on one side of the shoulder, with pairs of parallel lines depending diagonally from one side of the band. The motifs and technique appear very similar to "classic" Lapita (Green 1979).

DISCUSSION

Although analyses such as that of pot form and combination of decorative elements are difficult to carry out on this assemblage, some other aspects are of interest.

1. Although there appear to be no differences in the motifs used, three quarters (74%) of all decorated sherds are on calcareous fabric. However, since these sherds are generally smaller (Table 10), the incidence in terms of area of pot covered by decoration was probably about the same for the two fabrics.

2. Rye (1976) notes that calcareous tempers may be used in pots because they give greater resistence to thermal shock and are more suitable for cooking on open fires. We cannot tell whether this functional distinction was made at Lesu but, if so, we would expect it to be manifest in macroscopic form also.

3. It is clear that Lesu pottery belongs to the "incised and applied" decorative tradition found throughout island Melanesia (Gifford 1951; Gifford and Shutler 1956; Garanger 1971; Golson 1972; Specht 1969). Pottery of this tradition is found contemporaneous

with and later than Lapita and is at times in association with it, though we do not claim this on the basis of one sherd at Lesu. Nonetheless, an approximate contemporaneity between the two traditions seems likely, on the basis of the carbon dates and the incorporation of Lou Island obsidian into the wider trading system (White, Downie, and Ambrose 1978).

CONCLUSIONS

The limited excavations carried out at Lesu demonstrate that a maritime-oriented, ceramic-producing, trading economy existed in the area sometime within the last 2500 years. We believe the economy was a village one, based largely on gardening (for which we have no evidence), with domestic pigs, shellfish, and fish supplying protein. The economic picture is different from that given by the inland shelter of Balof, where hunting provided much of the protein, but similar to that suggested by Clay (1974) for Pinikindu.

The trading network of prehistoric Lesu was extensive, including the Admiralty Islands (obsidian, pottery) and either the offshore islands or southern New Ireland (stone, pottery, or temper). Obsidian from Talasea was present in minor amounts.

The pottery from Lesu has its closest links, in terms of decoration, with that from Vanuatu, and can be analyzed within the framework constructed by Garanger. The meaning of such similarity, however, remains to be discovered, as does the reason for the cessation of pottery-making anywhere in New Ireland by the time of European contact.[1] If it can be shown that pottery-making was a relatively short-term phenomenon, dating to more than 2000 years ago, it might be appropriate to relate its occurrence in some way to the appearance and disappearance of dentate-stamped Lapita pottery, but to do so now would be premature. Green (1979) believes that the New Ireland–New Britain area is the heartland of the Lapita cultural complex, but we are as yet far from testing this belief. It is certainly the logical area in which to seek the origins of outer Melanesian, and Polynesian, settlement.

This preliminary excavation, along with that at Balof, has demonstrated that a range of site types exists (see also Clay 1974). White's surveys in the area also showed many stone terraces, presumably agricultural, and inland house sites, delineated by stone walls. Additionally, caves and overhangs with paintings (Peterson and Billings 1965; Robinson 1969; White, field notes) and stencils (White, field notes) occur, and similar sites may be used for burial at times. Local schools and other groups have acquired some numbers of artifacts, mostly mortars and pestles, but these have not been described or fitted into any kind of context. We consider that northern New Ireland can now be seen to have the potential for more sophisticated research in culture history, including that of technology and exchange networks, as well as environmental manipulation and land use.

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[1] A. J. Duffield (1884, 1886) is the only author to report pottery in New Ireland, and in each publication only a passing reference is made. We assume his report is erroneous, as it is in conflict with all others.

members cooked superbly. Sau and other villagers worked on a weekly basis; Jim Allen and Martin Buluna assisted the excavations for some time.

Particular aspects of the analysis were assisted by Ken Aplin (fauna), P. D. Hohnen (stone sourcing), Penny Ann Hughes and Margrit Koettig (drawings), Ian Lock (shell habitats), and Jim Specht (pottery technology). We thank them all.

Appendix 1: Bone Artifacts

Mound V

Horizon I

Human premolar with caries below the enamel and very worn crown. Two biconical holes have been drilled through the roots. (Fig. 3*d*)

Horizon II

Spatulate end of a broken lime spatula. Length 131 mm, heavily stained over the lowest 40 mm. Made of a section of long bone. (Fig. 3*a*)

A probable spatula fragment, shaped as the preceding but without the spatulate end. Length 73 mm.

Segment of long bone shaft (?tibia), broken at the ?distal end, flaked and worn at the other.

Unipoint, lenticular-oval cross section. Probably ground from a splinter of long bone, but no medullary cavity or cancellar tissue visible. One end is broken, but shows no evidence of biconical tapering. Length 41 mm. (Fig. 3*e*)

Detached (possibly unfused) distal process of ?human femur, cut and ground through at about its midpoint.

Ground unipoint of ?bird bone. The point is heavily ground. Very similar tools were used as awls in the nineteenth century. Length 80 mm. (Fig. 3*f*)

Horizon III

Human skull fragment cut and ground to a square shape.

Proximal end of a human tibia cut vertically on either side of the main process and ground to an elongated oval shape. Length 34 mm, width 11 mm. (Fig. 3*c*)

Mandible fragment, possibly pig, with the base ground to a sharp edge.

Horizon IV

Human skull fragment (30 mm × 30 mm), broken to an approximate square and with deep striations across one surface.

Mound VI

Horizon I

Long bone of small mammal with one articular end worn smooth. Length 22 mm.

Horizon II

Spatula made from long bone. The spatulate end is broken and the tool itself was recovered in two pieces. Length 92 mm. (Fig. 3*b*)

Two pieces of human skull (47 mm × 17 mm) ground on the edges and scored over one surface.

APPENDIX 2: SAND TEMPERS IN LESU SHERDS FROM NEW IRELAND

*W. R. Dickinson**

Of 14 sherds sent for study by Peter White from Lesu on New Ireland, 8 were examined in thin section. Of these, 5 contain closely related volcanic sand tempers inferred to be indigenous and collected locally. The other 3 contain calcareous sand tempers undiagnostic of origin, except that rare silicate grains are identical to the dominant grain types in the volcanic sand tempers. From this, the calcareous tempers are inferred also to be indigenous to the general Lesu area. The distinction between calcareous and noncalcareous tempers had been made correctly by the collector (White) prior to my microscopic work.

Volcanic Sand Tempers

The volcanic sands used as temper are all moderately sorted and crystal-rich aggregates probably collected as stream sands. Their compositions are similar enough to suggest derivation from the same drainage system or from closely related streams tapping the same kinds of bedrock sources. The variability in textures of rock fragments and in types of ferromagnesian mineral grains implies drainages large enough or diverse enough to tap different segments of a volcanic terrane. Frequency counts (Table A2.1) indicate that several sherds (51–8, 51–9, 51–13) contain virtually identical sands that could well have been collected from the same site or pit, but that other sherds (51–10 and 51–14) contain sands of related but somewhat disparate compositions implying collection from different sites. The two sherds with contrasting tempers both contain much more hornblende in relation to pyroxene.

Plagioclase and clinopyroxene mineral grains are the dominant constituents of the Lesu

TABLE A2.1 FREQUENCY PERCENTAGES OF GRAIN TYPES IN LESU VOLCANIC SAND TEMPER

SHERD NO.:	51–8	51–9	51–13	AVERAGE OF PRECEDING 3	51–10	51–14
Grain Type						
Plagioclase (feldspar)	56	51	57	55	44	61
Pyroxene (clino-)	34	39	33	35	20	12
Hornblende (brown)	2	2	1	2	13	7
Opaques (Fe-oxide)	2	2	2	2	10	4
Rock Fragments (volcanic)	6	6	6	6	13	16

NOTE: Rare olivine and oxyhornblende also present in some tempers; data from traverse counts of 200 grains each in thin section.

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volcanic sand temper. Derivation from volcanic rocks is implied by the presence of strong oscillatory zoning and glass inclusions in many plagioclases, and by the association of the pyroxenes with subordinate brown hornblendes and rare oxyhornblendes. The volcanic rock fragments have a range of textures typical of andesitic rocks, in which plagioclase and clinopyroxene with or without hornblende are commonly the dominant phenocrysts. Suitable volcanic sources form the bedrock of New Ireland, and there is no petrographic reason to suspect that the wares were imported to Lesu from elsewhere. The volcanic sand temper is thus regarded provisionally as indigenous to New Ireland or a similar nearby island.

Calcareous Sand Temper

The calcareous sands used as temper are well sorted but variably abraded aggregates composed of skeletal or organogenic reefal detritus doubtless collected in a coastal setting marked by fringing or offshore reef flats. Rare plagioclase and clinopyroxene mineral grains disprove importation from an atoll setting. As these types of grains are dominant in the Lesu volcanic sand temper, there is a strong implication that the calcareous sands were collected along a coast near the streams that yielded the volcanic sands. Both tempers are thus inferred to have come locally from the general Lesu area.

Comparisons and Conclusions

Tempers in all the sherds examined are interpreted to be variants of a local New Ireland temper suite. In common with tempers from nearby Anir as well as Buka and Bougainville, pyroxene and hornblende occur jointly. However, hornblende is generally less abundant than in Bougainville sherds, and rock fragments are less abundant than in Buka sherds. Moreover, none of the varied volcanic sands observed in sherds from Anir Island match the Lesu tempers. In brief, the Lesu tempers generally resemble others from the region of junction between the Bismarck archipelago and the Solomons chain, but in detail have a distinctive character that argues for local origin on the basis of available data.

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